



# Enclosures to protect and conserve

For better livelihood of the West Pokot community



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**T**he Swedish International Development Cooperation Agency (Sida) has supported rural development programmes in eastern Africa since the 1960s. Through its Regional Land Management Unit (RELMA), Sida promotes initiatives to strengthen small-scale land users in order to enhance food security and reduce poverty.

RELMA, the successor of Regional Soil Conservation Unit (RSCU), is based in Nairobi and operates mainly in six eastern and southern African countries: Eritrea, Ethiopia, Kenya, Tanzania, Uganda and Zambia. RELMA's goal in the region is to improve livelihoods of small-scale land users and enhance food security for all households. In pursuit of this goal, RELMA promotes environmentally sustainable, socially and economically viable farming and marketing systems, and supports policies that favour small-scale land users.

RELMA organizes, on a regional level, training courses, workshops and study tours. It also gives technical advice, facilitates exchange of expertise and produces information material for the dissemination of new knowledge, techniques and approaches. A variety of reports, handbooks, posters and other information materials are published and distributed in the region on non-profit making basis.

### **About this book**

*Enclosures to protect and conserve* is a field guide for frontline extension staff and development agents working with pastoral or agropastoral communities to improve their land resources. The content is based on the RELMA Technical Report No. 22, *We work together – land rehabilitation and household dynamics in Chepareria Division, West Pokot District, Kenya*.

The key to land recovery in West Pokot and similar communities has been to demarcate and secure individual tenure of farm property. Once this is achieved, owners may choose to fence portions of their land for controlling the grazing and improving the plant cover. This guide provides useful information about six grasses and six agroforestry trees one should include in any effort to re-vegetate degraded rangeland.

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Cover photo top: A recovered enclosure with plenty of grass

Cover photo bottom: *Balanites aegyptica* hanging on only by its roots on severely eroded ground

Drawings of grasses from *Tropical grasses*, by PJ Skerman and F Riveros, with permission from Food and Agriculture Organization of the United Nations; Drawings of trees by Ann Birnie from earlier RELMA publications with permission. Drawings on pollarding and coppicing by Charles Nyogot.

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# Foreword

The preparation of this field guide was proposed during the launch of the mother publication *We work together, land rehabilitation and household dynamics in Chepareria Division, West Pokot District, Kenya*, Technical Report No. 22. Our goal is to share the information in that book to a wider audience, particularly to the West Pokot community and other communities within the Vi Agroforestry Project.

This guide highlights one of the main benefits of the land rehabilitation programme, i.e. an increase in available fodder for livestock. This is a key to improving the livelihood of the West Pokot community, and other agropastoral communities in eastern African dryland regions. The long-term goal is that such guides are prepared in local language for easy reading by the land users.

I commend the initiative of Ms. Christine Holding, RELMA's former agroforestry advisor, who coordinated the preparation of the parent text from which this guide is taken, and also the continued efforts of Vi Agroforestry Project team in making this valuable field experience available.

*Åke Barklund*  
Director, RELMA



We use thatch grass  
to make a roof for protecting  
ourselves from cold rain and hot sun.  
We can also use grass and trees  
to give the same protection  
to our grazing land.

# The message

## Bare land leads to erosion

In West Pokot District (Kenya), changes in livestock grazing patterns – due to insecurity, population pressure and drought – have led to a serious reduction in vegetation. Large areas once well covered with pasture and trees have become entirely denuded, eroded, and useless.

Can these lands be rehabilitated? Can the agro-pastoral landowners themselves do this, with minimal ‘inputs’ or assistance from outside? How long does it take for an enclosed pasture to recover? What are the best grasses and trees to use in regenerating degraded rangeland? What are some of the management methods that can prevent pastures from degrading in the first instance?

This field guide will give you the answers to some of these questions.

## Rehabilitation is possible

Several years of work by Vi Agroforestry Project and the community of Chepareria Division of West Pokot District (Kenya) have shown that enclosing the land with thorn fencing has many benefits. Among these are the following:

- Increased livestock feed
- Increased livestock production
- More fuel wood
- Higher land value
- More water

An important precondition for successful rehabilitation of degraded land is informal boundary demarcation to transfer access rights from the wider community to individual herd owners. This is not the same as formal adjudication and registration of titles under the Land Registration Act (an expensive and very slow process). It is a process that must be done through the local authority, such as the management committees of the group ranch or other local governing bodies.

# The best grasses for rehabilitating enclosures

This section describes six types of grasses that are good for reintroducing to enclosed pasture. Emphasis is given to grasses that are commonly found in West Pokot, easy to identify – indeed well known by farmers and herders – and relatively easy to establish.

It is important to use a mixture of different kinds of grass – to take advantage of their different growth habits and nutritional value as animal forage. Remember: there is strength in diversity.

## *Pasture grasses of importance in pasture recovery in West Pokot*

<b>Pokot name</b>	<b>Common name</b>	<b>Scientific name</b>
Seretion	Star grass	<i>Cynodon dactylon</i>
Ngiriamat	Red oat grass	<i>Themeda triandra</i>
Chaya	Bush rye grass	<i>Enteropogon macrostachyus</i>
Pekonion	Black or bunch spear grass	<i>Heteropogon contortus</i>
Churkechir	Maasai love grass	<i>Eragrostis superba</i>
(no Pokot name)	Rhodes grass	<i>Chloris gayana</i>

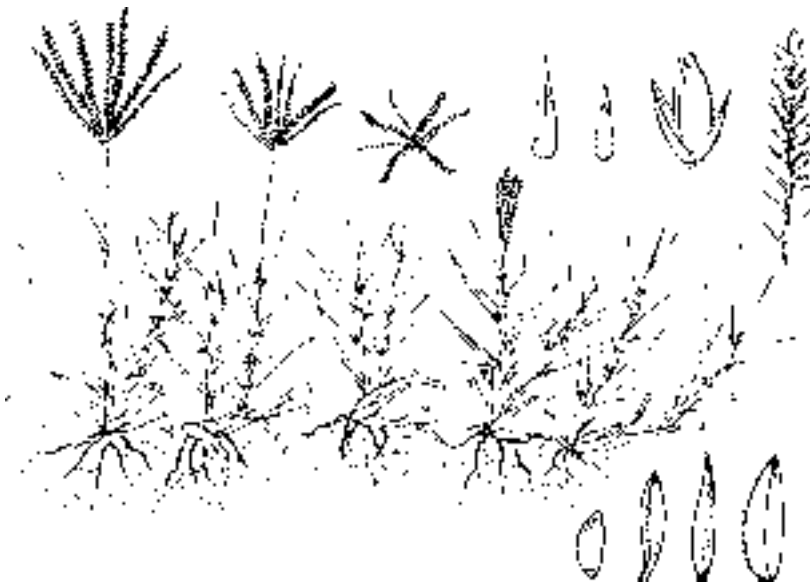
# Star grass

Star grass is a perennial grass that produces 'stolons', or underground runners that help it spread, hold the soil, and resist drought.

Star grass is good for livestock feeding as well as conserving soil. It is easy to establish and its fodder is highly palatable to all livestock. It tolerates heavy grazing and should be grazed closely for higher feeding value. Star grass harvested at the right time – as it is flowering – makes good hay. Where it is plentiful in enclosures it can be left as standing hay for dry season feeding.

Star grass was found growing abundantly in five enclosures out of seven surveyed in Chepareria Division. Star grass can be propagated through seeds. However, good soil preparation is required and a high seeding rate (5 kg/acre) is recommended because of poor seed germination.

Re-establishing star grass in enclosures can be done using turf. This means a surface layer of good star grass growth can be transplanted into a roughly ploughed area in the enclosure.



*Cynodon dactylon* (scientific name)

**Seretion** (Pokot)

# Red oat grass

Red oat grass disappears quickly on overgrazed land because all livestock favour it. However, it is drought and fire resistant and recovers quickly after a fire. This makes it a potential livestock feed resource in such situations. Red oat grass is best for livestock feeding at early stages of growth. It becomes less palatable and loses its feeding value when mature.

For this reason, red oat grass is generally not highly regarded as a pasture grass due to its low feeding value. However, the grass is a valuable resource in West Pokot because of its durability for thatching.



*Themeda triandra* (scientific name)  
**Ngiriamat** (Pokot)

## Bush rye grass

Bush rye grass is a tufted annual or perennial grass. It is a good grass for drylands because it is drought resistant. It is palatable and a suitable fodder for young animals. It is also recommended for soil conservation. Bush rye grass was only found in one enclosure out of the seven surveyed in Chepareria Division. It is therefore not as common as star grass or red oat grass.

Bush rye grass is propagated by seed. It is a good seeder and the seeds can be collected rapidly by cutting the seed-heads by hand. It is an excellent grass for reseeding enclosures because it germinates readily and grows vigorously.



*Enteropogon macrostachyus* (scientific name)

**Chaya** (Pokot)

# Bunch spear grass

At early growth stage, bunch spear grass is a good grass for livestock feeding. At maturity this grass is harmful to animals due to its sharp awns (see drawing). It is tolerant to fire, grows well on poor soils and is used for soil conservation.

In Chepareria, bunch spear grass is found growing on rocky outcrops. Farmers value it as forage for sheep and young calves. Bunch spear grass has an excellent ability to spread naturally. The seeds can even withstand bush fires.

Sharp awns on mature bunch grass can injure eyes of grazing livestock



*Heteropogon contortus* (scientific name)  
**Pekonion** (Pokot)



## Maasai love grass

*Eragrostis superba*, commonly known as Maasai love grass, is a densely tufted perennial, growing 30 to 90 cm high. It is quick growing and palatable to all livestock. As with most other grasses, it gets fibrous and less palatable near maturity.

Maasai love grass spreads naturally by seed. It has good drought tolerance and can be sown among other grasses in enclosures to improve the diversity. Once this grass is established, controlled grazing is necessary as it can be grazed out.



*Eragrostis superba* (scientific name)

**Churkechir** (Pokot)

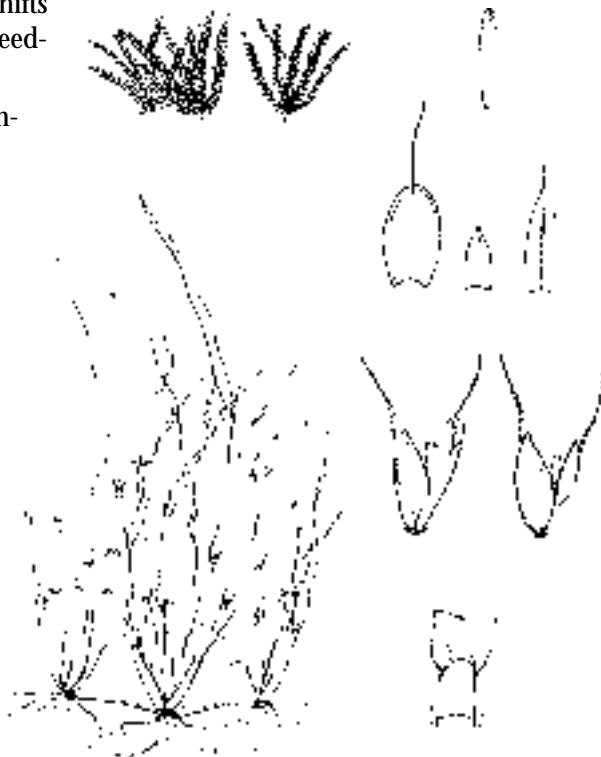
# Rhodes grass

Rhodes grass is an improved pasture species, which has been developed over years of research. It does well in open woodlands and grasslands. Introduction of Rhodes grass in Kongolai Division increased biomass production.

The grass is established mainly by sowing, with a seeding rate of 0.5 to 2 kg per acre. It also has the ability to establish naturally, although may require better land preparation (i.e. light ploughing at the onset of rains) for better establishment.

Rhodes grass should be well established before grazing. For use as dry-season fodder, the highest feed value is obtained from Rhodes grass when harvested just before flowering. This is true for most grasses, since once the plant produces seed, most of the nutrient value shifts from the stems to the seed-heads.

Rhodes grass competes well with other pasture species due to its initial vigorous growth.



*Chloris gayana* (scientific name)

# Trees and shrubs for land rehabilitation

Trees and shrubs are valuable resources in grazing lands and complement the grasses as sources of livestock fodder and browse. Trees have multiple uses such as:

- Shade both for human and livestock
- Wood for construction, fuel wood and charcoal
- Leaves as vegetable for human consumption
- Animal fodder
- Litter for soil fertility improvement
- Flowers provide nectar for bee forage
- Medicinal value
- Cultural conservation
- Deep tree roots extract nutrients from deep soils to the upper soils
- Scenery and landscape beauty

Six important species that can be planted in enclosures or around homesteads are presented here.

*Valuable indigenous trees and shrubs for enclosures in West Pokot*

<b>Pokot name</b>	<b>Common name</b>	<b>Scientific name</b>
Tyunwo	Desert date	<i>Balanites aegyptiaca</i>
Koloswo	Mbarao (Swahili)	<i>Terminalia brownii</i>
Rotin	Sausage tree	<i>Kigelia africana</i> or <i>Kigelia aethiopium</i>
Sitot	Mfukufuku (Swahili)	<i>Grewia bicolor</i>
Tirokwo	Buffalo thorn	<i>Zizyphus mucronata</i>
Ses (plural: Sesyai)	Umbrella thorn	<i>Acacia tortilis</i>

# Desert date

Scientific name: *Balanites aegyptiaca*, Pokot name: Tuyunwo

Desert date is valued for its fruit and its leaves for livestock feed.

## Growth

Desert date is an evergreen slow growing semi-deciduous tree of about 6 to 10 metres in height. Leaves are mostly produced during the rainy season and fruits during the dry period.

## Management

Regeneration through

- Wild seedlings and root suckers.
- Direct seeding from fruits eaten by animals (germinate in 1 to 4 weeks). Nursery seedlings have limitations due to the development of long taproot. This gives a low seedling survival rate when transplanted.

Young seedlings require protection from livestock.

## Uses

- Food and fodder
  - Ripe fruits are edible for both human beings and livestock.
  - Leaves are used as fodder for livestock.
  - Young and tender leaves are boiled, pounded and then fried or mixed with fat and eaten as vegetable.
  - The kernels are boiled for 2 to 3 hours and eaten.
- Medicine
  - Decoction of roots are used for the treatment of malaria, boiled root in soup for treatment of oedema (sir) and stomach pains.
  - *Balanites* fruit put in canals or standing water kills snails, which carry bilharzia, and water fleas which carry the guinea worm.
- Other uses
  - Branches are used as dead fence.
  - Extract from the fruit and bark is used as pesticide.
  - It can also be used as source of oil.
  - Sticky resin from stems are used to glue feathers onto arrow shafts and spear heads onto shafts.

- Wood is hard, durable, termite resistant and easily worked. It is used for making wooden spoons, pestles, mortars, handles, stools, combs, yokes, timber, fuel-wood, charcoal, poles, pounded bark added to water produce lather used as soap.



**Desert date** (English)  
*Balanites aegyptiaca* (scientific name)  
**Tuyunwo** (Pokot)

# Mbarao (Swahili name)

Scientific name: *Terminalia brownii*; Pokot name: Koloswa

Mbarao is a drought and termite resistant tree with good potential for agroforestry in drylands.

## Growth

A leafy deciduous tree of 7 to 13 metres height with a rounded crown. It grows fairly fast on moist sites.

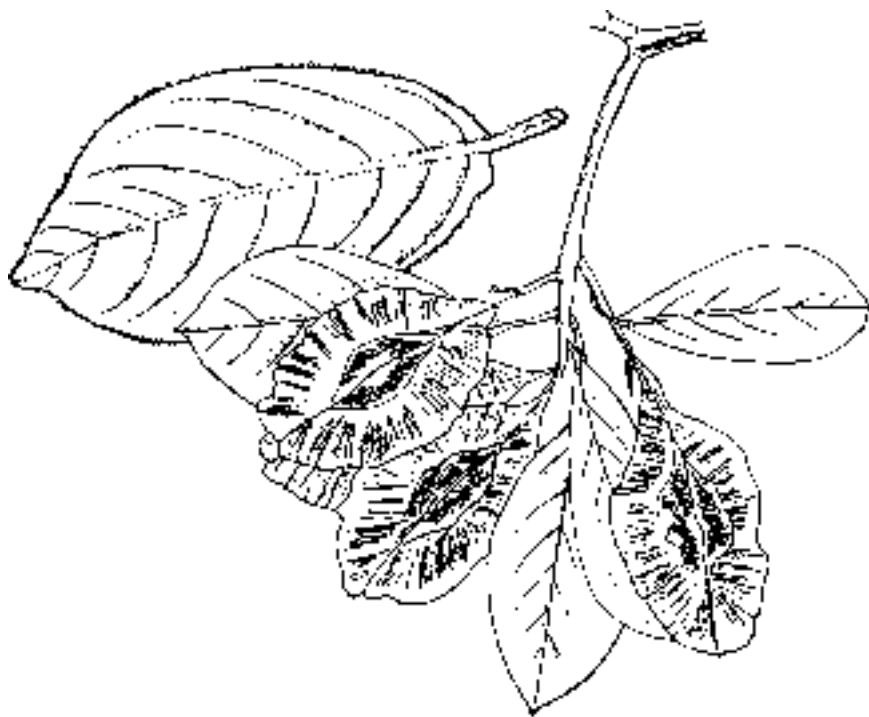
## Management

Propagation through seedlings or wildings. Fresh seeds give good and fast germination of about 30% in 60 to 90 days. Seed pretreatment is by removal of wings and nicking of the woody covering.

Mbarao can be pollarded and coppices well.

## Uses

- Food and fodder
  - The leafy branches provide good fodder.
  - Children eat bitter fruits.
- Medicine
  - Leaves are used as medicine for stomachache and diarrhea in both humans and livestock.
  - Leaf extract used to treat pink eye in livestock.
  - Bark decoctions cause vomiting, is used as remedy for fever and colds and treatment of hepatitis.
- Other uses
  - Good mulch due to its heavy leaf production. The wood is termite resistant, hard, durable and used for charcoal, firewood, timber, poles, posts, tool handles, utensils (mortar and pestle), soil improvement, shade, and dye.



**Mbarao** (Swahili)  
*Terminalia brownii* (scientific name)  
**Koloswo** (Pokot)

# Sausage tree

Scientific name: *Kigelia africana*, Pokot name: Rotin

The sausage tree does not compete with crops, and should be promoted as an agroforestry tree.

## Growth

The Sausage tree is a semi-deciduous tree usually 5 to 8 metres high with a rounded crown.

## Management

Propagation through seedlings or wildings. The seed germination is slow and poor and they are only released when the fruit rots on the ground.

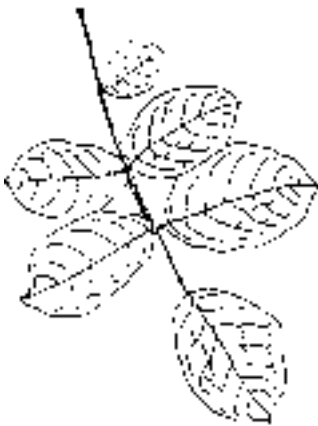
## Uses

- Food and fodder
  - Fruits are used for preparation of local honey beer.
  - Flowers are good bee forage.
  - Flowers and young leaves are used as fodder.

*Warning:* Unripe fruits are poisonous.

- Medicine
  - Fruit extracts are useful in treating skin conditions.
  - Bark medicine for swollen spleen and breast.
  - Leaves also have medicinal properties.
- Other uses
  - Firewood, charcoal, timber (yokes) and poles.
  - Spray from crushed leaves is used in organic farming as insecticide and in control of termites.





**Sausage tree** (English)  
*Kigelia africana* or *Kigelia aethiopicum* (scientific name)  
**Rotin** (Pokot)

# Mfukufuku (Swahili name)

Scientific name: *Grewia bicolor*; Pokot name: Sitot

## Growth

Mfukufuku is a shrub or small tree of 1 to 8 metres high with a light crown.

## Management

Propagation through seedling or root suckers. Seed has good germination when pre-treated by soaking in cold water for 12 hours. The tree coppices well once it has developed a good root system.

## Uses

- Food and fodder
  - The fruit is edible.
  - Used as animal fodder.
- Medicine
  - Massaging and healing
  - Root decoction is used for diarrhea in humans and mixed with another species (sokotwo) for the extraction of after-birth in cattle.
  - The pounded bark is applied locally for body itches.
- Other uses
  - The wood is used in house building and to make bows, arrows, walking sticks, herding sticks, spear-shafts and clubs.
  - Important in traditional ceremonies e.g. blessings. Leaves are used by traditional healers in exorcising spirits and used to produce smoke in weddings and circumcision ceremonies and for treating sick cattle.
  - Water diviners use mfukufuku twigs to locate underground water.



**Mfukufuku tree** (Swahili)  
*Grewia bicolor* (scientific name)  
**Sitot** (Pokot)

# Buffalo thorn

Scientific name: *Ziziphus mucronata*, Pokot name: Tirokwo

## Growth

Buffalo thorn is an extremely thorny shrub, normally 4 to 8 metres high with rather straight branches ascending at first then dropping. Common along dry river courses.

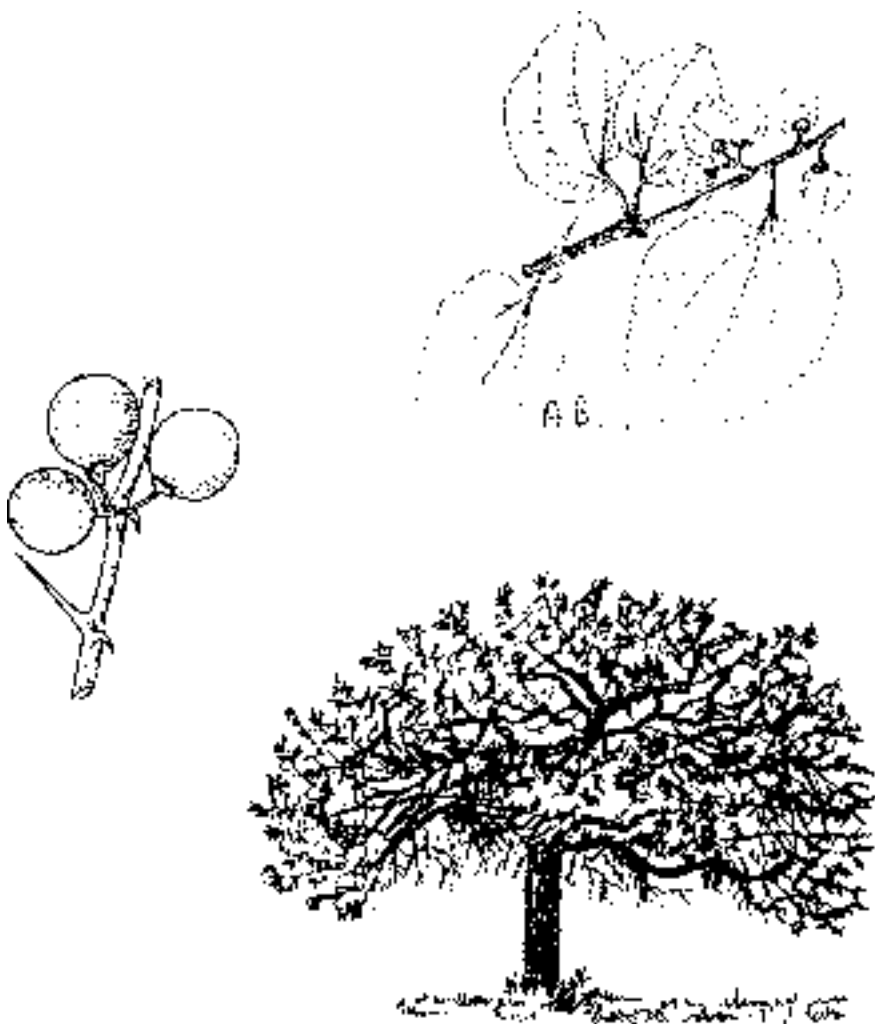
## Management

Propagation through seedlings. Seed have slow and poor germination, hence pre-treatment is required to break the dormancy. Carefully crack or break the hard outer seed coat along the two evident lines of weakness on the seed coat, using a sharp knife, without injuring the embryo.

Coppices well and can frequently be trimmed for higher fodder production, or to make an excellent fence.

## Uses

- Food and fodder
  - Used as fodder, especially for camels and goats.
  - Cream fruit pulp is eaten raw.
  
- Medicine
  - Cold bark infusion is used for enlarged spleen.
  - Tea from bark is used to cure stomach complaints.
  - Poultices, roots and leaves pounded into a soft moist mash, are widely used for boils, skin infections and chest pains.
  
- Other uses
  - Live fence, charcoal, wood for building, wood carving and handles for hoes.



**Buffalo thorn** (English)  
*Ziziphus mucronata* (scientific name)  
**Tirokwo** (Pokot)

# Umbrella thorn

Scientific name: *Acacia tortilis*, Pokot name: Ses (in plural: Sesyai)

## Growth

Umbrella thorn grows in grasslands all over the continent of Africa. The crown of young trees is narrow, but in mature trees the main branches spread out to form an 'umbrella' shape. Trees are usually short, 4 to 8 metres, but can reach 20 metres height along river courses. It is usually deciduous (drops the leaves) but sometimes evergreen.

## Management

Propagation through direct seeding, seedlings and natural regeneration. The seed germination is poor unless pre-treated by passing through animal gut; put in hot water which is then cooled and soaked for 24 hours or scarification. Bushfire also trigger seed to germinate.

Young trees need protection until they have grown beyond the reach of goats. Branches of mature trees can be cut away to obtain fodder as well as firewood.

## Uses

- Food and fodder
  - Flowers, pods and leaves are eaten by goats and camels.
  - Dry seeds can be made into flour and mixed with milk for porridge.
  - Bark can be used to make milk go sour.
- Medicine
  - Boiled infusion of bark is used for diarrhoea and stomach ache.
- Other uses
  - Firewood, charcoal and dead fence.
  - Bark fibres are used for making string and rope.
  - Hard wood is used for houses, fenceposts, stools and other furniture.
  - Excellent for intercropping with bananas, pawpaws and cereals.



**Umbrella thorn** (English)  
*Acacia tortilis* (scientific name)  
**Ses** In plural: **Sesyai** (Pokot)

# Enclosure management

Land users usually find the initial work of enclosing their land fairly easy, with assistance from the Vi Agroforestry Project. However, a big investment of time and material is required if the perimeter fencing is to remain effective at keeping out livestock for several years. Some farmers are unable to keep up their fences due to lack of time or poor support from family members, or lack of fencing materials.

Fortunately, in most cases, within a few years of protection, the benefits gained from the improved pasture outweigh the hard work of rehabilitating and managing it. Below are the main management activities that need to be done once an area has been fenced for enclosure:

- Repairing and strengthening existing thorn fences. Using sisal and euphorbia cuttings to eventually replace dead branches with a live hedge is a good idea.
- Cultivating smaller plots within the enclosure for crop production.
- Gathering grass seed from other locations to sow within the enclosure.
- Guarding the enclosure to keep out livestock.
- Repairing any existing eroded gullies using small check dams made of stones, planted sisal, to prevent further degradation and conserve soil and water.
- Planting desirable trees within enclosure from the home nursery, or direct seeding.
- Pruning existing trees to improve grass yield beneath, make tree grow straight for future use as poles, use the pruned branches to reinforce the perimeter fence. See next page for two methods for pruning trees.

To maintain enclosures as part of rangeland management systems, it is also necessary to build up a social understanding within the community, to respect ownership of the resources in the enclosures.

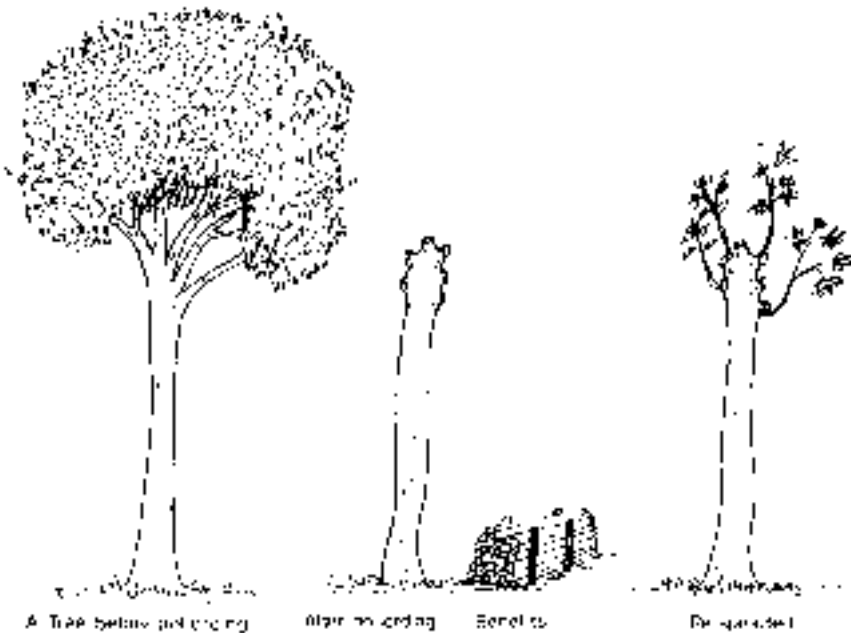


## Pollarding and coppicing trees

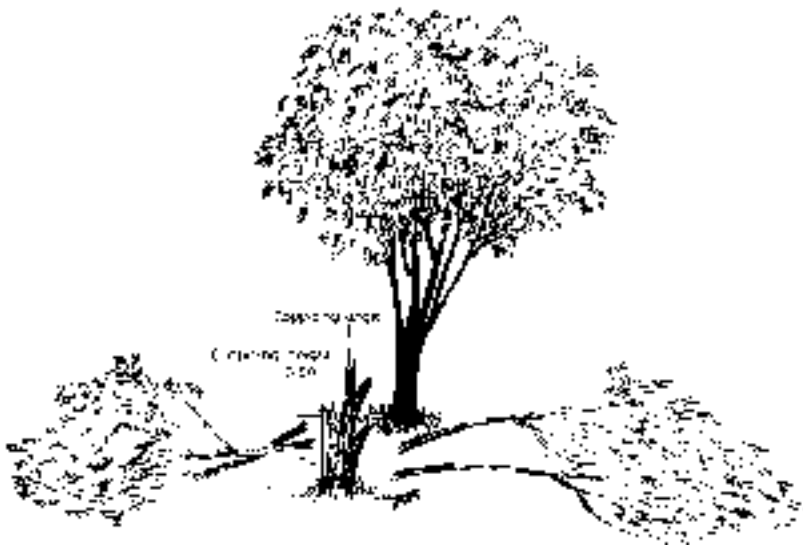
To maximize the value of trees established in enclosures, some pruning is necessary. It is important not to prune too early (within the first two or three years) to allow the young tree to develop a strong root system. Once well established, there are two slightly different ways to manage trees, depending on the farmer's needs; pollarding and coppicing.

Pollarding involves cutting away branches several metres from the ground. It is best for producing firewood and where food crops will be planted under the trees.

When coppicing, the tree is cut back at about knee height, forcing the tree to have a shrubby shape with many branches. This method is ideal for producing forage for livestock (where they are not browsing on the tree directly).



*A tree before and after pollarding.*



*How to coppice a tree.*



*Re-growth from a coppiced tree.*